REMARKS

Applicants appreciate the Examiner's thorough consideration provided to the present application. Claims 1-9 and 18-24 are currently pending in the instant application. Claims 1, 18, 21 and 24 are independent. Additional claims 21-24 are fully supported by the original written description, including, but not limited to, claims 18, 19 and the supporting description of FIG. 1 found generally at paragraphs 0028-0030 of the specification. Reconsideration of the present application is earnestly solicited.

Claim Rejections Under 35 U.S.C. § 103

Claims 1, 3, 4, 6, 18 and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hyde et al. (U.S. Patent No. 5,779,006) in view of Carew (U.S. Patent No. 2,013,948). Claims 1, 3, 4, 6, 18 and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Riebe (U.S. Patent No. 5,709,288) in view of Carew. Claims 1, 3, 4, 6, 18 and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hyde et al. (U.S. Patent No. 5,558,186) in view of Carew. Claims 1, 3, 4, 6, 18 and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Cook (U.S. Patent No. 3,712,427) in view of Carew. Claims 2, 5, 7-8 and 19 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over each of the combinations of Hyde et al. in view of Carew; Riebe in view of Carew; Hyde et al. in view of Carew; and Cook

in view of Carew; and further in view of Pigford (U.S. Patent No. 4,982,818). Claim 9 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over each of the combinations of Hyde et al. in view of Carew; Riebe in view of Carew; Hyde et al. in view of Carew; and Cook in view of Carew; and further in view of Pigford and Hill et al. (U.S. Patent No. 4,011,055). These rejections are respectfully traversed.

With respect to claim 1, Applicants submit that the prior art of record fails to teach or suggest the unique combination of elements of the claimed invention, including the limitation(s) of "at least one frictional lining disk having *an annular and sinusoidally-shaped mounting surface* and a relatively, flat wear surface *on an opposite side of said at least one frictional lining disk from said sinusoidally-shaped mounting surface of said at least one frictional lining disk, said mounting surface of each frictional lining disk matingly engaging said mounting surface of said structural core.*" (emphasis added)

With respect to claim 18, Applicants submit that the prior art of record fails to teach or suggest the unique combination of elements of the claimed invention, including the limitation(s) of "a first frictional lining disk having *an annular and sinusoidally-shaped mounting surface* and a relatively, flat wear surface *on an opposite side of said first frictional lining disk from said sinusoidally-shaped mounting surface of said first frictional lining disk, said mounting surface of said first frictional lining disk matingly and directly*

engaging said first mounting surface of said structural core; and a second frictional lining disk having *an annular and sinusoidally-shaped mounting surface and* a relatively, flat wear surface *on an opposite side of said second frictional lining disk from said sinusoidally-shaped mounting surface of said second frictional lining disk, said mounting surface of said second frictional lining disk matingly and directly engaging said second mounting surface of said structural core.*" (emphasis added) Accordingly, these rejections should be withdrawn.

Applicants respectfully submit that the prior art of record fails to teach or suggest each and every element of the combination of elements of the claimed invention. The claimed invention provides a brake assembly that includes a uniquely shaped structural core and removable friction lining disk(s) not shown in the prior art of record.

Applicants respectfully submit that the Examiner must consider the entirety of the teachings of the Hyde et al. ('006), Riebe and Hyde et al. ('186) references. Specifically, the type of structural core and frictional lining elements described by these references are not suitable for the modification proposed by the Examiner and allegedly suggested by Carew. Accordingly, the resulting combination/modification of these primary references would not result in a stronger friction lining to core, carrier or connection between frictional elements as suggested by the Examiner. In contrast, the primary

references would no longer function as originally intended, i.e., these references are not the type of brake that can be modified to include the sinusoidially shaped mounting surface allegedly taught by Carew. Accordingly, these rejections must be withdrawn.

Hyde et al. ('006), Riebe and Hyde et al. ('186) all describe clamshell type structures with peripheral engagement of the frictional lining material. Specifically, recesses or windows of the carrier engage the frictional lining material along the outer edges of the frictional lining, e.g., not along the surface opposite to the wear surface. In contrast, relative movement between the carrier and the frictional lining elements of these references is prevented by the structure formed or engaging the frictional lining elements along their periphery, i.e., the edges of the windows contain the frictional lining element and further absorb or transmit forces from the wear surfaces to the relatively stronger structural core of Hyde et al. ("006), Riebe and Hyde et al. ('186). Accordingly, the alleged mounting surfaces of these primary references cannot reasonably be construed to include an annular and sinusoidally-shaped mounting surface. Further, one of ordinary skill in the art would not modify the alleged flat mounting surface, e.g., the flat portion lying within the window regions of the carrier to include the sinusoidally-shaped mounting surface(s) of the claimed invention as the edges of the windows are already designed to engage the frictional elements.

In the clamshell type of construction, the friction material is retained within recesses (see FIG. 2 of Riebe, FIG. 15 of Hyde et al. '186, and FIGs. 15 and 16 of Hyde et al. '006) and is secured to the carrier in a segmented, i.e., not annular, manner. Accordingly, this type of construction does not permit the modification suggested by the Examiner and allegedly taught by Carew. Specifically, the friction lining elements (for instance, element 42 in the Hyde patents) are retained along their peripheries, e.g., not along a mounting surface opposed to the relatively flat wear surfaces (see col. 6, lines 22-48 of Hyde et al. '006 and col. 5, lines 10-29). Accordingly, the retaining clips and recesses of the annular carriers of the clamshell type brakes prevent the friction lining elements from moving relative to the annular core. In contrast, the mounting surfaces between the annular core and the frictional lining elements of the claimed invention provide direct load transfer and simultaneously prevent movement of the friction lining elements relative to the annular core.

Since the frictional elements are secured within these windows along their periphery, the alleged modification of the clamshell type carriers/cores of Hyde et al. ("006), Riebe and Hyde et al. ('186) to include an annular sinusoidal mounting surface opposite to the wear surface would not have been obvious as the frictional elements are already secured at expressly different locations along their periphery. Accordingly, Carew does not teach or suggest any

motivation to alter this type of clamshell type brake assembly to include sinusoidally shaped friction elements.

With respect to Carew, the Examiner has indicated that the drum brakes of Carew teach or suggest applying similar frictional lining elements to each of the primary references, e.g., disk brakes, relied upon by the Examiner. This interpretation is respectfully traversed. The Examiner has relied upon the embodiment of FIG. 3 of Carew to show that a subsidiary brake element of friction material for a drum brake includes transverse corrugations (element 16 and 18). The Examiner's position is that Carew's drum brake with transverse corrugations stands for the broader teaching that this type of physical structure, a reusable annular core having transverse corrugations matingly engaging with friction elements (element 17) can also be applied to disk brake assemblies. This position is respectfully traversed as being based solely on an improper hindsight, reconstruction of the prior art of record that is based on the teachings of Applicants own invention. Applicants are not requesting that the Examiner agree or disagree with the advantages of the present invention described in their own patent application. Instead, Applicants request that the Examiner point to actual teachings in the prior art of record that support the allegedly routine swapping of features of the disk brake art with the drum brake art suggested by the Examiner at page 4 of the Office Action.

Even if Carew were analogous to the disk brake art as suggested by the Examiner, Carew is clearly not analogous to the clamshell type friction segments described by the primary references. Applicants submit that the Examiner is ignoring the details of the "disk" brakes of the primary references when attempting to alter these same references to include features of the drum brake of Carew. Applicants submit that these rejections are improper as the Examiner has overlooked the structure of the primary references that inherently teach against the alleged modifications advanced by the Examiner.

For example, Carew is clearly directed at drum brakes for automobiles, e.g., although Carew suggests that the drum brakes of Carew's invention are applicable to other vehicles that may employ drum brakes (see col. 4, lines 3-12). However, Carew does not teach or suggest the application of the curved metal core and the curved friction lining elements of Carew to disk brakes. This application of Carew's frictional lining elements (element 17) to a disk brake is merely the opinion of the Examiner as this suggestion does not come from the references themselves. Even if it were the Examiner's position that this motivation would have been implicitly suggested to one of ordinary skill in the art, this position is respectfully traversed as being unsupported by any of the references of the prior art of record.

None of the references teach or suggest annular and sinusoidally shaped mounting surfaces engaging an annular structural core. Accordingly, this

rejection should be withdrawn. As previously stated, the transverse corrugations of Carew are relied upon by the Examiner as being the equivalent to the sinusoidally shaped mounting surfaces of the claimed invention. However, this position is respectfully traversed. None of the references of the prior art of record teach or suggest modifying the mounting surface opposite to a wear surface in a disk brake assembly to include annular and sinusoidally shaped mounting surfaces. As described by Carew at col. 2, lines 1-17:

> "The main brake element part and that side of the subsidiary brake element part which engages therewith will be formed with complementary irregularities so that when the latter is in position upon the former, *the circumferential displacement of the one with regard to the other will be rendered impossible*; the pressure exerted by the brake element as a whole through the medium of the subsidiary brake element part upon the brake drum merely causing said subsidiary and main parts to engage more effectively one with the other."

As described by Carew, the irregularities (transverse corrugations 16, 18) are provided to offset circumferential movement of the friction lining element (element 17 in FIG. 3) that is curved along the surface that forms the wear plane, i.e., a problem unique to drum brakes. Since Carew does not teach or suggest any application to disk brakes, the Examiner's contention that the mounting surfaces of Carew would have been applied to the primary references is improper. The individual corrugations of Carew are provided to prevent the curved friction lining element from rotating within the drum or with respect to the curved, metal (thin slipper). When force is applied to one section of the

friction lining element, the individual corrugations are provided to prevent the curved friction element from rotating, e.g., shifting circumferentially. The annular structural core and disks of the claimed invention (and the disk brakes of the prior art of record relied upon by the Examiner) are not susceptible to the circumferential movement described by Carew. Therefore, Applicants submit that Examiner's modification of the prior art of record is improper.

With respect to Cook et al., the prior art of record does not teach or suggest any known problems with the disk brake assembly shown by Cook. Carew does not teach or suggest the application of sinusoidally shaped mounting surfaces to disk brakes. Therefore, this combination would not have been obvious. Applicants submit that the Examiner's opinion that it would have been obvious to modify the primary references, e.g., such as Cook et al., to include the sinusoidally shaped mounting surfaces is somehow implicitly suggested in the references themselves is improper.

The Examiner will note that Cook et al. is directed at mechanical fasteners to secure core plate(s) 20 to frictional wear plates 22. Further, col. 2, lines 58-68 through col. 3, lines 1-12 further describe the expressed purpose of the brake disk assembly of Cook et al.:

> *FIGS. 4A, B, C, 5A, B, C and 6A, B, C represent the refurbishment cycle which is believed to represent the optimum procedure.* The first refurbishment is illustrated which shows in view 4A a brake disk indicated by numeral 50 which has been worn about 0.060 so that for a rotating disk it would have a thickness of about 0.480 inches and for a stationary disk about

> 0.520 inches. *The refurbishment technique in its first step will constitute grinding both faces of the disk 50 faces, or about 0.030 so that for a rotating disk the thickness would be approximately 0.450 inches and for a stationary disk the thickness would be about 0.490 inches.* The initial thickness is then achieved by refurbishing with a carbon plate or disk 52 as indicated in view 4C that is approximately 0.150 inches in thickness to thereby increase the overall disk thickness by that amount, hence bringing the total disk thickness up to the desired pre-worn condition. The plate 52 is attached in a manner as illustrated in FIGS. 1 through 3, but is attached only on one side as indicated in view 4C.

Cook et al. is clearly directed at a disk brake assembly that is specifically directed at refurbishment that involves grinding wear faces and replacing worn elements to return the disk brake assembly to a working thickness. Further, the mechanical fasteners for securing the thin pate to the core are designed for a system in which the wear faces are replaced with wear plates that are specifically grinded down to achieve an optimum working brake assembly thickness. As discussed with respect to Hyde et al. ('006), Riebe and Hyde et al. ('186), Cook et al. is specifically directed at a disk brake assembly that secures the wear surfaces to the core along a periphery of the wear surfaces to prevent relative movement between the wear faces and plate. However, there is no mention of any attempt to improve or secure the mounting surface between the plates (see the flat mounting surface between elements 50 and 52). Accordingly, Cook et al. is precisely the type of refurbishment technique that Applicants have identified as being problematic and for which the unique combination of limitations of the claimed invention are directed at overcoming.

Although Carew provides an alternative to securing drum brake wear surfaces by rivets extending through both a core and the wear surface (see col. 1 of Carew), Carew does not explicitly or implicitly suggest that the corrugated mounting surfaces (see 17' in FIG. 3 of Carew) are intended to improve upon mounting structure for securing wear surfaces on either disk or drum brakes that are typically secured only along their periphery.

Hyde et al. ('006), Riebe, Hyde et al. ('186) and Cook et al. specifically describe structural cores which engage friction wear plates that are entirely and expressly secured by mechanical elements along peripheral edges of the wear plates. Therefore, Applicants submit that the alleged modification(s) of these references to include corrugated mounting surfaces opposite to the wear surface in lieu of or in addition to the peripheral engagement taught by the primary references is in direct contrast to the expressed teachings of these references. Since these references are all directed at ways of improving upon peripherally securing wear plates to a structural core to prevent movement between the members, one of ordinary skill in the art would not attempt to modify the flat mounting surface opposite to the wear surfaces as these references themselves already purportedly overcome any problems associated with securing friction lining elements to a structural core. Therefore, these rejections should be withdrawn.

Traversal of Examiner's Use of Official Notice

The Examiner is directed to the Examiner's comments occurring on page 4 of the Office Action mailed on January 19, 2005. The relevant portions are provided hereinafter.

> The claims are directed to the disk brake art while Carew (2013948) is directed to the drum brake art. These technologies are inseparably linked. Carew (21 03948) is reasonably pertinent to the particular problem with which the invention is directed, i.e., strengthening the connection between a lining and its core, carrier or backing plate by a sinusoidal interface so as to hinder separation during use by the interlocking nature with the added ability to replace the lining quickly by the use of a mechanical fastener. See MPEP 2141.01(a) and MPEP 2145. Carew is considered to be analogous art in view of the above. *One having ordinary skill in the art recognizes the similarity between disk brake and drum brakes as it pertains to connecting the linings, whether involving a friction disk brake lining or involving a friction drum brake lining re its associated support, carrier, core or backing plate. One having ordinary skill in the disk brake art routinely looks to the drum brake, clutch and fastener technologies when arriving at the type of fasteners available best suitable for the application involved.* (Emphasis added)

The last two sentences of the paragraph reproduced hereinabove form the basis for the Examiner's motivation to alter the Hyde et al. ('006), Riebe ('288), Cook ('427) and Hyde et al. ('186) references with the alleged teachings of Carew. However, Applicants submit that the Examiner is relying upon motivations to modify the primary references that are either:

1. Applicants' own teachings (as admitted by the Examiner in page 3 of the Office Action; and/or

2. The use of the knowledge of one of ordinary skill in the art (Official Notice).

Applicants submit that it would be improper to rely upon Applicants' own teachings to modify the primary references as advanced by the Examiner. Alternatively, if the Examiner is relying upon Official Notice to state what one of ordinary skill in the art would recognize or routinely look to, Applicants respectfully traverse the Examiner's use of Official Notice and submit that the Examiner must provide evidence of these teachings in the references themselves to continue to maintain the current rejections based upon the Carew reference (see MPEP § 2144.03)

In accordance with the above discussion of the patents relied upon by the Examiner, Applicants respectfully submit that these documents, either in combination together or standing alone, fail to teach or suggest the invention as is set forth by the claims of the instant application.

Accordingly, reconsideration and withdrawal of the claim rejection are respectfully requested. Moreover, Applicants respectfully submit that the instant application is in a condition for allowance.

As to the dependent claims, Applicants respectfully submit that these claims are allowable due to their dependence upon an allowable independent claim, as well as for additional limitations provided by these claims.

Newly-Added Claims

Newly-added independent claim 21 is directed to a brake assembly, which comprises: a torque tube for attaching to an axle of a wheel; a disk stack formed by an alternatively arranged plurality of stator and rotor disks; and a housing containing pressure piston devices for compressing the disk stack of stator and rotor discs, wherein at least one disk within said disk stack includes a friction disk. The friction disk specified in claim 21 includes, *inter alia*, an annular structural core having a first sinusoidally-shaped mounting surface and a second sinusoidally-shaped mounting surface; and a first frictional lining disk having an annular and sinusoidally-shaped mounting surface and a relatively, flat wear surface on an opposite side of said first frictional lining disk from said sinusoidally-shaped mounting surface of said first frictional lining disk, said mounting surface of said first frictional lining disk matingly and directly engaging said first mounting surface of said structural core.

Therefore, independent claim 21 recites features of a friction disk that were emphasized above in distinguishing claim 1 over the applied prior art. Therefore, the patentability arguments presented above with respect to claim 1 also distinguish the features of claim 21 over the applied prior art (i.e., Hyde, Carew, Riebe, Cook, Pigford, and Hill). Claims 22 and 23 depend from newly-added independent claim 21, and therefore, define over the prior art at least for these reasons.

Independent claim 24 is directed to a disk stack for a brake assembly, wherein the disk stack is formed by an alternatively arranged plurality of stator and rotor disks. The disk stack of claim 24 comprises at least one friction disk within the disk stack, the friction disk having: an annular structural core having a first sinusoidally-shaped mounting surface and a second sinusoidally-shaped mounting surface; a first frictional lining disk having an annular and sinusoidally-shaped mounting surface and a relatively, flat wear surface on an opposite side of said first frictional lining disk from said sinusoidally-shaped mounting surface of said first frictional lining disk, said mounting surface of said first frictional lining disk matingly and directly engaging said first mounting surface of said structural core; and a second frictional lining disk having an annular and sinusoidally-shaped mounting surface and a relatively, flat wear surface on an opposite side of said second frictional lining disk from said sinusoidally-shaped mounting surface of said second frictional lining disk, said mounting surface of said second frictional lining disk matingly and directly engaging said second mounting surface of said structural core.

Therefore, like claim 21, claim 24 recites the features of a friction disk that were relied on to distinguish claim 21 over the applied prior art. Therefore, at least for the reasons presented above with respect to claim 1, claim 24 defines over the prior art.

CONCLUSION

Since the remaining references cited by the Examiner have not been utilized to reject the claims, but merely to show the state-of- the-art, no further comments are deemed necessary with respect thereto.

All the stated grounds of rejection have been properly traversed and/or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently pending rejections and that they be withdrawn.

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

In the event there are any matters remaining in this application, the Examiner is invited to contact D. Richard Anderson, Registration No. 40,439 at (703) 205-8000 in the Washington, D.C. area.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit

Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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